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THE ORCHIDARIUM OF RIO DE JANEIRO BOTANIC GARDEN, BRAZIL

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ABSTRACT. The Rio de Janeiro Botanic Garden, founded by Dom João VI in 1808 as an Acclimation Garden for exotic plants, was transformed over nearly two centuries into the Research Institute of the Botanic Garden of Rio de Janeiro (JBRJ). During the administration of the naturalist João Barbosa Rodrigues, which began in 1890, the first JBRJ greenhouse was built to shelter all sorts of "indoor" plants. Later it concentrated on the Orchidaceae collection. In 1996, the glasshouse and the area surrounding it were renovated, and since then, the orchid collection has been recovered and restructured with the support of a sponsor. Presently all collection data are filed using the BG-Recorder Computer Program, with a total of 3652 accessions and 4177 registered plants. Although the collection is composed mainly of Brazilian species, with ca. 358 species identified, there are also exotic plants and hybrids. New specimens and species are incorporated in the collection through several floristic surveys. Most of the surveys being developed in the JBRJ are conducted in Conservation Units of Rio de Janeiro State. It is important to note that well-documented institutional collections are essential for effective conservation measures and help taxonomic studies.

Key words: Orchidaceae, ex-situ conservation, database

RESUMO. O Jardim Botânico do Rio de Janeiro foi fundado por Dom João VI em 1808 como um Jardim de Aclimação de plantas exóticas, transformou-se, ao longo de quase dois séculos de existência, em Real Horto, Real Jardim Botânico, Jardim Botânico do Rio de Janeiro e, mais recentemente, Instituto de Pesquisas Jardim Botânico do Rio de Janeiro (JBRJ). Durante a administração do naturalista João Barbosa Rodrigues, que teve início em 1890, foi construída a primeira estufa do JBRJ que mais tarde passou a abrigar todo o acervo referente à família Orchidaceae. A partir de 1996 a coleção vem sendo recuperada e reestruturada com o apoio de um patrocinador. Atualmente, o acervo está informatizado e conta com 3652 acessos e 4177 plantas registradas. A coleção é composta principalmente de espécies brasileiras, cerca de 358 espécies identificadas. Entretanto, há também plantas exóticas e híbridas. Novos espécimes e espécies são incorporados à coleção através dos diversos levantamentos florísticos que são desenvolvidos pela instituição, principalmente em Unidades de Conservação do Estado do Rio de Janeiro. Vale ressaltar, que coleções institucionais bem documentadas são fundamentais para medidas conservacionistas eficazes e auxiliam estudos taxonômicos.

Palavras chave: Orchidaceae, Conservação ex-situ, Banco de Dados

INTRODUCTION

The history of the Rio de Janeiro Botanic Garden begins with the Portuguese Royal Family's arrival in Brazil. Founded by Dom João VI in 1808, the Royal Garden or Acclimation Garden received the seeds and scions brought by navigators and naturalists (Secchin & Meyer 1993). In the Garden, spices, medicinal plants, plants of economic importance, and food plants were cultivated. When Dom João returned to Portugal in 1821, the Royal Garden was cared for by Dom Pedro I, his son, who opened its doors to the public through guided visits. In 1824, Frei Leandro do Sacramento took over administration as the first botanical director. He changed it from a garden of exotic plants to an

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institute of botanical studies. In 1889, after proclamation of the republic, the Garden was placed under the direction of João Barbosa Rodrigues and renamed The Rio de Janeiro Botanic Garden. A new era started with an increased collection and creation of the herbarium, the library, the preserved fruit collection, and the botanical museum (Rodrigues 1989). The collection was enriched by plants collected on field trips. A greenhouse was built and opened to the public. Between 1890 and 1894, ca. 150,000 people visited the garden. The 19 years under the direction of J. Barbosa Rodrigues were certainly the most glorious for the Garden, for botany, and for knowledge of our orchids. Competent administrators and botanists, including A. Pacheco Leão, P. Campos Porto, A.F.M. Glaziou, J.G. Kuhlmann, and A. Ducke, continued with the responsibility of enlarging the collection and divulging the scientific works of the Institution (Ferreira da Silva et al. 2001). Many botanists, in addition to J. Barbosa Rodrigues, devoted special interest to orchids, such as P. Campos Porto, A.C. Brade, E. Pereira, A.P. Duarte, G.F.J. Pabst, D.B. Sucre, and P.I.S. Braga.

Beginning in the 1960s, however, the Orchidaceae collection stagnated. There was little increase in the collection, except for contributions of the botanists G. Martinelli and A. Toscano de Brito. Many plants in the living collection died, and all information referring to the collection was lost. No progress was made in identification of living or preserved plants. In 1996, a sponsorship agreement with the jeweler Antonio Bernardo allowed maintenance of the Garden's living collection of orchids. A team was established under the leadership of A. Toscano de Brito to organize and maintain the collections. Our work, during the past 8 years, has been based on the need to construct a collection, store information, stimulate research, divulge published works, and especially promote orchid conservation.

Methods and Materials

Cultivation and Database

The Orchidarium recovery work, which began with the greenhouse restoration, then treated all of the orchids, those in vases and those living on the trees (Figure 1). Each orchid received an accession number, but, unfortunately, the records contained no information other than the plant name. To enrich the Rio de Janeiro Botanic Garden Orchidarium, data on the orchid collection were obtained from literature sources, for example, the plants collected by A. Campos Porto in Itatiaia. Many plants referenced by the author in Contribution to the Knowledge of Orchidaceae Flora from the Itatiaia Mountain (1915) are still living in the Orchidarium. Additionally, plant information brought by Barbosa Rodrigues from Amazônia and by other botanists, such as J.G. Kuhlmann and P.I.S. Braga, is mentioned on herbarium labels, indicating that the plants might have been in culture in the Orchidarium. Unfortunately, this information was lost, and 979 accessions in the Historical Collection do not have origin data (Figure 2).

Using the BG-Recorder computer program developed by Botanic Gardens Conservation International (BGCI), the numbering and identification of each species is updated continually. Procedures for cultivation, phytosanitary treatment, repotting, fertilization, reproduction, and flowering also are registered in the database. With cultivation of plants collected from the wild, all data relating to a plant—origin, associated material in alcohol, dried material, pictures, and collector—are registered in the BG-Recorder. Currently under consideration are the choice of software and organization of the collections; however, no plant information will be lost. Presently, in addition to the enchantment of our public with the beauty of our orchids, we are capable of giving support to floristic surveys and conservation, which are a major purpose of a botanic garden.

Orchidarium Collection

At present, the Orchidarium has 1109 fully documented accessions of wild species, the majority being from the State of Rio de Janeiro (Table 1). JBRJ researchers have contributed substantially to enriching the collection. In all, the orchid collection has 113 accessions of plants collected by G. Martinelli in various Brazilian states, 237 collected by A. Toscano, especially in Espírito Santo and Bahia states, and 64 by C.N. Fraga in Minas Gerais, Rio de Janeiro, and Espírito Santo states (Table 2). These researchers also deposited plants of new species, such as *Myoxanthus ruschii* Fraga and L. Kollmann and *Rauhiella silvana* Toscano.

The 727 accessions from Rio de Janeiro were collected mainly by the Orchidarium team, M. Moraes, G. Cattan, M. Bocayuva, and E. Saddi (Table 1). More intense field work was carried out in Macaé de Cima and in preserved areas such as the Tijuca National Park (PN Tijuca), the Tinguá Biological Reserve (REBIO Tinguá), and Serra dos Órgãos National Park (PARNA Serra dos Órgãos). Plants from high altitudes of the Macaé de Cima region were not destined for the living collections, since they do not adapt to the climatic conditions of the Orchidarium. In

FIGURE 1. Orchidarium of the Rio de Janeiro Botanic Garden. **A.** Glasshouse entrance before restoration. **B.** Glasshouse interior before restoration. **C.** Glasshouse entrance today. **D.** Glasshouse interior today. **E., F.** Orchid collections.

working with the Macaé de Cima collections, the main purpose is to document orchid species cited in Orchids of the High Mountain Atlantic Rain Forest of Southeastern Brazil (Miller & Warren 1994) and to enrich the JBRJ herbarium (RB) with species from the Atlantic Forest of the Macaé de Cima.

Two expeditions carried out in REBIO Tinguá in Rio de Janeiro, together with the Floristic Survey Project conducted in this preserved area, have resulted in 162 accessions. Among the 74 species identified for the area to date, 41% were determined only after they flowered in cultivation. These data show that the ex-situ collection is a valuable tool in helping floristic surveys. Such help was only possible, however, with improved cultivation techniques and greater care of the collection, both of which improve the chances of native orchids flowering in cultivation (FIGURE 3).

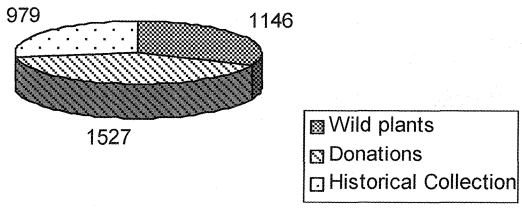

FIGURE 2. Number of plant accessions collected with complete data, plants donated, and plants from the historical collection of the JBRJ Orchidarium.

Projects under Development

The Rio de Janeiro State presently has several preserved areas, mainly of restinga and Atlantic forest. Few works or checklists exist, however, for the Orchidaceae family in these areas. O.J. Pereira and D.S.D Araújo (2002) published a list of species from restinga in Rio de Janeiro and Espírito Santo, with 102 species of Orchidaceae, 48 of them occurring in Rio de Janeiro. Other published surveys feature orchids in Itatiaia National Park (Campos Porto 1915), Serra da Tiririca State Park (Pinheiro 1999), and Cairuçu Environmental Protection Area (Souza Leoni 1997).

New floristic projects by post-graduate students address cultivation of native species. New cultivation techniques facilitate taxonomic study and support ex-situ conservation strategies. Three projects in preserved areas in restinga and Atlantic Forest are being developed together with the JBRJ Orchidarium. The first is a survey of orchid species in the Private Reserve of Natural Patrimony of Rio da Pedras (RPPN of Rio das Pedras) in the municipality of Mangaratiba, a significant remnant of Atlantic Forest to the south of Rio de Janeiro. The RPPN is known to contain 77 species and 43 genera (TABLE 3).

Another area under study is the Municipal Natural Park of Prainha (PNM of Prainha), which is located in Rio de Janeiro municipality. With an area of 126.3 ha of Atlantic Forest and several outcrops, the area faces many threats, such as urbanization of adjacent lands, fires, and extractive activities. To date, 26 species and 17 genera have been found (TABLE 3).

The third project is being developed in the Municipal Natural Park of Marapendi. Fragments of restinga characterize the area, where seven species of terrestrial orchids and one species of *Vanilla* have been found.

In addition to the studies cited above, donations and random collection carried out by researchers in different Brazilian states have enlarged the collection of the Orchidarium and the RB herbarium, contributing to the cataloguing of Brazilian biodiversity.

TABLE 1. Number of accessions collected by state, number of voucher materials deposited in the collection of the RB herbarium, and number of flowers preserved in liquid.

States	Accessions no.	Hebarium vouchers no.	Flowers in alcohol no.
Rio de Janeiro	727	212	221
Espírito Santo	78	10	15
Minas Gerais	49	10	10
Bahia	202	20	54

TABLE 2. Number of accessions by main collectors and states of collection.

Collectors	Accessions	States*
A. Toscano	237	BA, ES, MG, RJ, RS
C.N. Fraga	64	ES, MG, RJ
E. Saddi	136	RJ
G. Cattan	230	MG, RJ
G. Martinelli	113	BA, ES, MG, RS, RJ, PR, PE, SC, SP
M. Moraes	155	BA, MG, RJ, SC
M. Bocayuva	50	RJ

* Bahia (BA), Espírito Santo (ES), Minas Gerais (MG), Pernambuco (PE), Paraná (PR), Rio de Janeiro (RJ), Rio Grande do Sul (RS), Santa Catarina (SC).

CONCLUSION

At present, many Orchidaceae species are cited in lists of endangered species. The IUCN Red List includes 15 Brazilian species in its official list (Water & Gillet 1998), and the Brazilian Institute of Renewable Natural Resources (Miranda 1992) cites 10 species. These numbers, however, do not reflect the reality that we face every day, where extractive activities and habitat de-

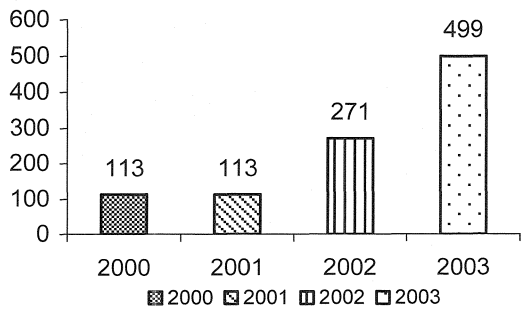

FIGURE 3. Number of wild plants that flowered from 2000 to 2003 in the JBRJ Orchidarium.

TABLE 3. Number of accessions, number of collections deposited in the RB herbarium, number of samples with flowers in liquid, and number of species per preserved areas.

Preserved areas	Accessions	Herbarium vouchers	Samples in alcohol	Species per preserved area
REBIO of Tinguá	162	91	59	74
RPPN Rio das Pedras	117	49	56	77
PN of Tijuca	76	15	22	21
Macaé de Cima	58	165	58	103
PNM of Prainha	51	47	14	26

struction are causing accentuated lost in our biodiversity.

Knowledge of orchid species and monitoring of populations in different areas can help to evaluate the conservation status of these plants and to establish priority locations for the creation of preserved areas. In the same way, a database of endangered species cultivated in botanic gardens is an efficient strategy for ex-situ conservation, as well as for helping reintroduction projects.

Finally, it is estimated that ca. 2400 orchid species (Barros 1996) occur in Brazil. Based on this number, the collection of the JBRJ Orchidarium clearly is small compared to the great diversity of the orchid family in our country. Data presented here, however, do show the value of a collection such as the JBRJ Orchidarium and Herbarium for systematic and conservation studies.

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